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The Ideal Potato Crop

By Harry W. Henderson

How big should our potato crop be?

Department of Agriculture potato experts say that an annual production of 375 million bushels would be just about the right size for this year and maybe next year. A crop of that size, they say, would provide civilians and people in the armed forces with an adequate supply of potatoes for food. There would be enough left over to seed the following year's crop, enough to take care of normal shrinkage and waste, enough for our expanded needs for potato starch, and enough to maintain a small volume of potato exports. Furthermore--returns to growers probably would hold at levels that would make extensive price-support operations unnecessary.

Dividing Line Thin

When Department economists say 375 million bushels, they mean just about that, for they have found that the line of demarcation between too much and too little is rather thin. Some economists argue that the variation from the ideal crop of 375 million bushels should not exceed 6 percent either way. In other words, a crop of 400 million bushels means a "surplus," while a production of 350 million bushels gets into the area of "scarcity."

The economists also warn that the ideal total crop must be distributed properly throughout the potato marketing year or it ceases to be ideal. For example, unusually large crops in North Carolina, Virginia, Maryland, Delaware, and New Jersey would mean heavy marketings through the summer--probably more than the market could absorb. As marketings would exceed the demand, prices would drop and the Government would be required to engage in support operations, even though the United States crop would finally total only 375 million bushels.

It all adds up to something like this: We can't eat our way out of a potato surplus--even a temporary or seasonal one--but we don't like to reduce our consumption of potatoes when supplies are short, either. In other words, our demand for potatoes is, as the economists put it, "relatively inelastic," which means that price within broad limits is not so much a factor in the case of potatoes as it is in the case of sirloin steak or fruit out of season, say. We don't overload our plates with potatoes just because potatoes happen to be the best buy in the grocery store. We like other vegetables too. Yet we don't reduce our consumption of potatoes greatly when prices become a little steep. Potatoes can't entirely replace other vegetables in our diet, but neither can other vegetables quite take the place of potatoes.

Though our consumption of potatoes is not affected as much by prices as our consumption of other foods, there are some long-time trends in our potato-eating habits that deserve comment. These trends could have an

important bearing on the size of the ideal potato crop a few years from now.

From 1910 to 1939 there was only a moderate increase in total potato production. At the same time, there was a rapid increase in the population of the United States. As the following table will show, the interrelationship of these trends meant a decrease of 17 pounds per capita between 1910-19 and 1920-29 and the same decrease between 1920-29 and 1930-39.

U. S. Population, U. S. Potato Production, and Per Capita Potato Consumption, Averages by Decades, 1910-39

Decade	U. S. population (Million persons)	U. S. potato production (Million bushels)	Per capita potato consumption (Pounds)
1910-19	98.6	340.1	168.8
1920-29	113.7	360.8	151.7
1930-39	127.6	363.0	134.6

This decrease in per capita potato consumption has been explained in various ways:

1. During the 30-year period from 1910 to 1939, the production and consumption of other fresh vegetables--such as snap beans, peas, tomatoes, and lettuce--increased very rapidly. Inasmuch as the human stomach is only so big, and, provided an individual is already getting enough total food to eat, any increase in the consumption of one food by an individual must be offset by a decrease in the consumption of others. From 1910 to 1939, potatoes apparently lost out in the race for consumers' favor.

2. Styles in human figures since 1910 have changed from buxom to slim, and the medical profession has in the past encouraged this change by warning us of the danger of excess poundage. Unfortunately, many people have a mistaken belief that potatoes as such are fattening and have cut down on their consumption.

3. We expend less physical energy than our parents did. Instead of walking to work or to the movie, we pile into an automobile. Instead of doing the work ourselves, we have developed devices for the factory and the home that do much of our work for us. So the demand for potatoes, as a substantial source of food energy, is hurt by our more inactive life.

All these explanations sound reasonable. But let's examine them a little more closely. First, will the increase in production and consumption of other vegetables continue to the point where potatoes are crowded completely off our dinner tables? Second, will our desire to streamline our bodies carry on to the place where we cut off our intake

of all starchy foods, including potatoes? (There seems to be a preference now for a little more padding upon the bones.) And last, will our work become such a push-button affair that we can forego all foods that supply energy? These things could happen, of course, but it doesn't seem likely that they will. It seems much more likely that per capita consumption will become stabilized at some point--just where, nobody knows.

There are already signs that the rate of the decrease is beginning to level off. Bureau of Agricultural Economics statistics show that civilian consumption of potatoes during the years 1940-46 averaged 129 pounds per capita. If the higher rate of potato consumption by people in the armed forces is considered, the over-all consumption during the years 1940-46 may have been only slightly less than the 134.6 pounds consumed during 1930-39.

If per capita consumption of potatoes does become stabilized, the size of the so-called ideal potato crop should be increased each year to allow for the increase in the population and for a widening development of industrial and other nonfood uses of potatoes. A crop of 375 million bushels of potatoes probably will be too small 10 years from now.

The Big Unknown Factor

What can we do to make sure that the potato crop each year is of ideal size? Frankly, it takes a lot of cooperation from Mother Nature. Potato production, as is the case with all farm crops, depends upon the acreage and the yield per acre. While producers are able to control the acreage planted, they can only partially control yields, which are so responsive to weather conditions. A relatively small acreage, plus a good growing season, will produce a big crop. And a large acreage will produce a small crop, if there is drought or any early freeze in important producing areas.

The Crop Reporting Board, on the basis of August 1 conditions, has estimated that production this year will total 362 million bushels. That is only 13 million bushels less than the currently "ideal" crop of 375 million bushels. But, as usual, the weather is the principal unknown factor. The final story won't be known until the late crop in northern areas is dug and stowed away in safe storage.

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POTATOES

USDA has asked farmers in Northeastern States to make arrangements to utilize potatoes as supplemental livestock feed, as an additional diversion outlet from heavy production areas.... On August 1, USDA announced that about half a million bushels of 1947 intermediate crop potatoes had been exported to Argentina. About half of these potatoes were acquired through regular commercial channels, and the rest were purchased by USDA under its price-support program.

Soft Corn This Year

By E. O. Umsted

This year, it won't be enough to wait till the wind blows through the crib cracks and dries out the corn. On August 21, in this year when grain is badly wanted here and abroad, USDA estimated a corn crop of 2,437 million bushels. Such a crop would be 202 million bushels smaller than the 1936-45 average and the smallest since 1936.

The news came on top of the realization that 1947 is a "soft" corn year. Much of the crop--up to one-fourth of it, according to one earlier estimate--may be high in moisture, low in feeding value, poor in keeping quality. If this high moisture was not to make the short crop shorter, special ways of drying and storing had to be pressed into use, and new and different equipment had to be rushed into the Corn Belt.

The work is under way.

Soft Corn

Soft corn may be a serious problem in the Corn Belt in any year when a late spring delays planting or when wet, cool weather during the growing season prevents proper maturing and drying of the crop. It includes ears that are substantially mature but still excessively wet, and immature and watery ears. In either case the excess water in the kernels and the cob is the principal cause of loss in storage.

A high percentage of moisture in corn is generally a result of late maturing. In the central part of the Corn Belt, for example, corn should mature (that is, reach the point where growth stops) by about September 15 to 20 if the corn is to dry sufficiently in the field by harvesttime. When corn does not mature until October, the cooler weather slows the drying rate and the time left is usually too short for proper field drying. Regardless of why the moisture content is high, some spoilage is to be expected if ear corn is cribbed in the ordinary way and if the kernels contain more than 20 percent of moisture. The higher the moisture content the harder it is to store corn satisfactorily.

The general requirements for methods of utilizing, handling, and storing soft corn are well known to Corn Belt farmers. Some of the right practices are:

1. Ensilage both fodder and shelled corn.
2. Sort soft corn and feed it early to hogs or other livestock.
3. Delay harvesting to allow maximum drying of ear corn in the field.
4. Husk clean to eliminate the trash that reduces ventilation in the crib.

5. Use screens on the elevator, to screen out shelled corn, silks, or other trash.

6. Distribute corn well in the crib to avoid pockets of shelled corn and debris, which is where spoilage is most likely to start.

7. Store corn of the highest moisture content in the narrowest cribs, to facilitate natural ventilation.

8. Use adequate ventilators in cribs.

These are methods that most Corn Belt farmers know about, and to put them into practice this year is certainly in order. But these methods alone are not going to be enough to prevent large losses in the quantity and quality of the 1947 crop. In addition, the situation calls for a great deal of efficient farm-type artificial drying equipment, plus competent technical help from which farmers can learn how to operate the equipment.

On July 21, 1947, a Corn Conditioning Conference met at Chicago to plan action and recommendations as to the mechanical conditioning of high-moisture corn. It was attended by representatives of the American Society of Agricultural Engineers, of USDA's Bureau of Plant Industry, Soils and Agricultural Engineering, of the State agricultural experiment stations, and of other agencies. The following recommendations were made:

Mechanical ventilation without heat.--This ventilation method may be used for ear corn with a moisture content of from 20 to 28 percent. When the air is unheated, a volume of 5 to 10 cubic feet per minute for each bushel of corn was suggested. For a moisture content as high as 24 to 28 percent, drying takes considerable time--perhaps several weeks for a reduction from 28 to 20 percent. Drying may not be completed before winter. Further fan operation may be necessary after the weather has started to warm up late in the winter or early next spring.

Fan operation.--The fan should be used only when the weather is favorable for drying. Ordinarily, this is when the temperature is above 50° F., and 60° and above is of course better. On clear days the relative humidity is usually low enough, especially in fall and winter. Good drying may be expected when the relative humidity is 65 percent or lower. The fan may be operated by electric motor, tractor, or gasoline engine.

Mechanical ventilation with heated air.--Use of heated air has certain advantages. It shortens the time of drying, and permits drying to continue even in weather when it would be impossible without heat. Corn of extremely high moisture content may be impossible to dry without heat. But air can easily be heated so much as to damage corn that is to be used for some purposes. Unless the corn is to be used as seed, however, temperatures below 130° F. are apparently safe.

Flue gas or smoke from an oil burner are usually mixed with the air forced through the corn in seed corn driers, with no apparent damage to

the corn. If coal is the fuel used, the smoke might be objectionable, but with coke there should be no objection to forcing the flue gas through the corn. From 20 to 50 percent of the heat value of the fuel is lost if the smoke is carried off in a chimney or flue.

Some precautions should be taken against fire. Air entering the furnace should be screened to prevent the entrance of husks, and an additional screening of the flue gas as it leaves the furnace is desirable if flue gas is mixed with the air that is forced into the crib. Ducts located near the furnace should be of all-metal construction. The burner should have an automatic cut-off so that high temperatures won't develop in case of fan failure.

Heater and fan capacities.--Assuming that oil is the fuel used and that the flue gases are to be discharged into the drying air, the recommended capacities of heaters and fans for drying 1,000 bushels of ear corn having a moisture content of 30 percent or more are given in the following tabulation:

With this heater capacity-- (Gallons per hr.)	And with this fan capacity-- (Cu. ft. per minute)	The approximate drying time will be-- (Days)
4.0	5,400	4 to 6
2.0	3,600	8 to 12
1.0	2,700	16 to 24
0.5	2,700	32 to 48

Air temperature.--The estimated drying times in the tabulation are for an outside air temperature of about 50° F. When the weather is warmer, drying will of course be faster. If the air is 20° warmer, for example, the drying period will decrease by about one-fourth. If it is 20° colder, on the other hand, the drying time will increase by about one-fourth.

For efficient drying, the heated air should be kept above 50° F. In very cold weather, it may be necessary to restrict the air delivery of the fan to keep the heated air temperature from dropping below 50°. This can be accomplished by closing off part of the air intake or outlet, or by reducing the fan speed.

Other fuels.--One gallon of oil is equal in heating value to 11 pounds of coal, 9 pounds of coke, 20 pounds of dry wood, 6 pounds of bottle gas, or 20 pounds of dry corn cobs. More fuel--up to double the amount--will be needed if some of the heat is lost because smoke and flue gases are not discharged through the corn.

Adapting cribs to ventilation with fans.--Farm cribs can be adapted for mechanical ventilation. In a double crib the driveway can be sealed to prevent air leakage by covering with building paper all the openings and cracks around doors. Driveway crib walls should be covered back about 4 feet from the doors to prevent this air from short-circuiting. Air blown by the fan into the driveway will then escape horizontally

through the cribs. In the case of a single crib, an air duct of temporary framework covered with reinforced kraft paper can be built along one side of the crib.

It is important to husk the corn as clean as possible, but any shelled corn and husks that remain should be distributed uniformly throughout the crib. The air flow will bypass any point where these materials accumulate.

Equipment and drying facilities.--Where hay-drying equipment is available, it can be used to good advantage in drying ear corn. Supplies of equipment for conditioning corn will be limited. Early ordering by farmers and custom operators is advisable. Manufacturers of lumber, motors, fans, oil burners, and other needed equipment can help by seeing that rural dealers have them when farmers need them. Seed corn driers and country elevators can dry some wet corn, but their capacity is not enough to handle the amount of high-moisture corn that is expected.

On July 29, USDA released a letter sent by N. E. Dodd, Acting Secretary of Agriculture, urging manufacturers and suppliers to channel materials and equipment into the Corn Belt. Items mentioned were materials for fabricating steel ducts, housings, and other parts for building corn-drying units--such as fans and electric motors, heating units to provide supplemental heat for the drier, and fuel for heating. Lumber, nails, and snow fencing will be needed, the appeal said, for ventilators and alterations. Building papers will be required for enclosing driveway openings where forced ventilation is used. Dealers were asked to canvass their territories and forecast probable needs. Manufacturers were asked to make sure that dealers in soft corn areas are stocked to meet farmers' needs.

"Let me point out," Dodd continued, "that the situation with regard to high moisture in this year's corn crop will be critical. An all-out effort by all parties concerned will be necessary to save every possible bushel. It is estimated that 25 percent of the crop may be affected--high in moisture content, low in feeding value, and of poor keeping quality. The farmer needs assistance right now. The agricultural engineers have developed procedures for conditioning the corn, and the Nation expects the manufacturers and suppliers to direct the necessary equipment to the Corn Belt to do the job. Failure in this task will mean increased suffering abroad and increased shortages of livestock products here at home."

On August 1, USDA announced that an intensive combined Federal, State, and private research program to develop portable corn-drying equipment practicable for farm or community use had been authorized as the first research project under the new Research and Marketing Act of 1946. Funds for such research became available for the first time in the Agricultural Appropriation Act of 1948.

E. A. Meyer, administrator of the research act, the announcement said, had designated Wallace Ashby of the Bureau of Plant Industry, Soils and Agricultural Engineering to head the engineering phases of the pro-

ject. Ashby called a preliminary meeting of interested Federal and State agricultural engineers and industrial consultants, to be held at Purdue University, Lafayette, Ind., on August 4 to work out plans for conducting the research.

"The possibility that as much as 200 million bushels of soft corn needed on farms for livestock feed will require drying to avoid spoilage lies back of the decision to use the resources of the Research and Marketing Act for this emergency project," Meyer said. "Under this act, as never before, Federal, State, and private forces can be mobilized into a research team to attack our pressing problems. Most of the work to be done under the act will be long term in nature, but as the present case indicates, the act also can be used in emergencies.

"Because the most critical time for soft corn will be this winter or early spring, depending on weather conditions, we feel that the agricultural engineers have an opportunity to test and develop corn-drying equipment which manufacturers can then turn out in time for farmers to use in drying their corn during the winter months."

As soon as agricultural engineers working on the project can draw up specifications based on latest available knowledge of corn-drying processes, it is contemplated that contracts will be let to private manufacturers for the construction of several models. From these can be determined by actual test the most practical types and sizes of machines for mass production.

On August 15, USDA announced that general service requirements for farm corn-drying equipment as agreed upon by State and Federal agricultural engineers were being released to manufacturers. At a meeting to be held at Purdue University on August 26, the announcement said, the engineers and interested State officials will discuss these requirements with the manufacturers. Then complete information on standard requirements for farm corn driers will be sent to county agricultural agents and county Agricultural Conservation Program committees.

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DRY MILK CORRECTION

"Milk for School Lunches," an article in the June 1947 issue of Marketing Activities, contained this statement on how dry milk may be reconstituted: "About an hour before serving, the head cook mixes the dry milk powder with cold water, using equal parts of dry milk and water."

Correct--so far as it goes. But the next sentence of the article, which should also have appeared in print and didn't, went on to say: "Just before serving time more water is added, until a serving of the resulting beverage is made up of 4 tablespoons of dry milk to half a pint of water."

Five Committees Recommend Projects Under Research and Marketing Act

Recommendations for research projects to be conducted under the Research and Marketing Act of 1946 were made recently by five commodity committees (feed, rice, seed, soybeans and flaxseed, and vegetables). The reports containing these recommendations are summarized in this issue of Marketing Activities.

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The Feed Advisory Committee gave priority to the research it recommended in the order in which the feed problems are set forth as follows. Most of the feed used by livestock is produced on the farm where it is fed, the committee said. Therefore, major emphasis in research should be on more efficient production, conservation, and use of the home-produced feed supply.

Production

1. Forage crops.--Research is needed to develop pasture programs for the different areas so that they can become more nearly complete and more dependable in providing the nutrients needed by the livestock maintained on individual farms. A 25-percent increase in the acreage of legumes and grasses is necessary for a balanced agriculture, the committee said. New varieties are needed which are adapted to particular localities, to harvesting, curing, and storage methods, and to the control of insect, disease, and weed pests. The development of hay standards that will reflect feeding values would help to promote uniformity in prices and improvement in quality. Serious losses occur during the harvesting of feed crops; improvements in machinery and better methods are needed to reduce losses from weather hazards and to promote efficiency.

2. Feed grains.--Several million acres of productive land are infested with perennial weeds. Annual weeds also take a large toll of costs in many sections. The committee recommended research to develop more economical ways of weed control.

3. Ranges.--Much overgrazing of ranges in past years has resulted in encroachments of weeds and shrubs. This extensive natural resource should be improved by research to develop cheap and thorough methods of eradication, better reseeding and management practices, and better adapted range grasses.

4. Weather.--Factors of weather affecting plant growth should be studied with the purpose of aiding plant improvement and production.

5. Management of farms that produce feed.--Experimental work has

uncovered important facts on breeding, fertilization, cultural management, diseases, insects, and processing of feed forage and cover crops. Study needs to be given to applying these facts on the farm in a combined and coordinated program aimed at improving the efficiency of feed production and utilization. The physical relationships in alternative practices for feed crops that are found through research need to be appraised from the standpoint of economic efficiency and their contribution to net farm income. The several enterprises and practices must be fitted together into a profitable system of farming.

Marketing

1. Marketing research on feed and feed grains.--Systematic study of all marketing functions should be made. This study would include the need (a) to maintain adequate market outlets by developing and maintaining higher levels of livestock products consumption, and by diverting surplus products into industrial uses and other channels of nonfeed utilization, and (b) to increase efficiency and lower the costs in the different marketing processes.

2. Feed grain storage.--Before heavy production gets under way to replace farm storage, a study (in cooperation with manufacturers) is urgently needed of methods of prefabricating grain bins to improve foundations and anchoring, to provide for effective fumigation, and to permit mass production at minimum cost. Prefabricators of aluminum, steel, and wood structures have indicated that they are willing to build experimental units and turn them over to USDA for testing. Improvements in the design of structures for commercial storage are also needed.

3. Commercial mixed feeds.--Formulation of mixed feeds has been left largely to the recommendations of agricultural experiment stations and research conducted by the larger manufacturers. Many large manufacturers make carefully controlled experimental feeding tests, but the results are not generally available to small feed manufacturers. The committee recommended close cooperation between the Federal Government, the experiment stations, and feed manufacturers. Studies are also needed to develop the best formulas for mixed feeds, to supply nutrient deficiencies of feed for specific areas, and to prepare mill plans suitable for small operators. In the study of feed nutrients, consideration should be given to mineral feeds, specialty feeds (dog, milk, fox, etc.), and medicated feeds. Also recommended was a study, with special reference to vitamins, of the loss of feed nutrients that occur during storage.

4. Byproduct feeds--new sources and treatments.--Technological developments have added various new feeds, and are capable of salvaging residues from the production of human foods and from industrial operations and of modifying the type of feed produced by new milling procedures. These developments require a study of efficient procedures that will make the products useful and economical additions to the over-all feed supply of the country.

5. Feeding value.--Livestock feeding experiments and laboratory

analysis are needed to extend the information on nutritive values of feedstuffs. Much research should be directed toward the development of better methods of feed evaluation and livestock feeding procedures that measure the nutritive values of feeds in terms of animal products.

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The Rice Advisory Committee, in its report, grouped the fields of recommended research into short- and long-run programs and also into "A," "B," and "C" priorities.

In the short-run class, an "A" priority was placed on the need for better information on the main factors involved in rice drying--such as temperature of the air used, rice temperature, cooling rate, drying rates, drying time, and the effects of different climatic conditions on germination, insect infestation, mill yields, and cooking quality. It is particularly urgent, the committee said, for the information now available on the factors involved in rice drying to be disseminated before the beginning of the next harvest season among persons interested in rice.

Because of the high moisture content of rice at harvesttime, adequate storage and drying are very important to rice farmers. The committee gave an A priority, in the short-run field, to storage improvement. It emphasized the need for a great deal of engineering research, for example, on size of bins, type of walls, insect control, size of spacing and type of ventilators, unit costs of various types of storage structures, and development of proper loading and unloading equipment.

Satisfactory grading standards for rough rice that are based on the quality and quantity of the outturn of milled rice have been needed for some time. The development of such standards for rough rice as well as the improvement of standards for milled rice were included in the short-run A priority group.

It seems certain, the committee said, that the development of containers of improved type and size and new recipes for the preparation of attractive, tasty, and nutritious rice foods would result in a more nearly standardized product and in increased consumption in many parts of this country. So the committee has included in the short-run A group the development of a package that would prevent rancidity, exclude insects, and prevent other kinds of deterioration until the rice reaches the consumer. The package should look attractive. Consumer surveys should be conducted to obtain information on the type, variety, and form of rice that consumers prefer.

In view of the probable reduction of foreign outlets within the next few years, an increase in domestic utilization is very important, the committee said. Research should include the development of new uses for rice in both food and industrial lines, as well as increased possible uses of bran, polish, and hulls. More valuable products from these byproducts might substantially increase the over-all value of rough rice. The committee particularly emphasized the importance of authorizing and

instructing the Southern and Western Regional Laboratories to add rice to the list of commodities on which this type of research work is to be undertaken.

Information on consumer response to price and income changes is basic to the development of programs to increase consumption. The committee gave it a short-run A-priority rating. Since the response to price changes in areas with heavy per capita consumption may be entirely different from that in areas of lighter consumption, a study by market segments would be valuable.

The committee stressed the need for an intensive short-run study of the techniques that would be helpful and practical in the foreign marketing of rice. This research might be particularly applicable to retaining the Cuban market and recovering European markets that could not be supplied during the war, as well as to developing new foreign markets. Also needed is reliable current information on the rice situation in foreign countries, especially the export possibilities for U. S. rice.

The committee's final short-run A-priority recommendation went to a study of the probable effects of various public policies and programs on the supplies, prices, domestic consumption, industrial utilization, exports, and demand for rice and rice products.

In the short-run B-priority group, the committee listed the development of ready-to-eat products and suggested a study of the method of collecting information and its use in estimating rice production and stocks in this country. Group studies of foreign consumption and production trends, also placed in this group, include the possibility of expanding premium markets for U. S. rice and attention to the costs and efficiency in surplus producing areas, particularly in the Western Hemisphere.

The short-run B-priority production fields include development of improved disease, insect, and weed control practices, and a program to increase the quantity and distribution of better seed. A study of the relative efficiency of various sizes and types of combines under different conditions was also listed in this group.

All other research was placed in the long-run category with a B or in a few cases a C rating. Improvements in milling and transportation were listed, as were research on special processing and nutritive qualities of rice. The committee suggested an economic study with accurate statistical measurement of the influence of prices on production, of the factors influencing prices, and of the influence of price, income, and other factors on the consumption of rice and rice products. The production fields in this group included breeding for improved or new varieties and types; irrigation, soil-management, and conservation practices; methods and sources of financing rice farms; and an economic evaluation of production methods and systems of farming.

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The Seed Advisory Committee, in outlining its recommendations for

research, divided its report into two sections--forage crop seeds and vegetable seeds--and recommended that the two sections be rated of equal importance. Within the section, items are listed here in the order of priority given them by the committee.

FORAGE CROP SEEDS

Production Problems

1. Increasing seed supply of improved grasses and legumes.--The need for increasing the seed supply of improved grasses and legumes was given highest priority among the forage seed problems. A balanced permanent agriculture, the committee said, will require an increase estimated at 25 percent in the acreage of grass and legume crops. Marked improvements would result from greater use of the improved varieties of suitable forage crop seed produced in recent years, but the supply of seed is wholly inadequate. There are many reasons for this inadequacy. To improve the situation the committee assigned first priority to harvesting and related problems, believing that this field offers the best prospects for tangible and important results quickly. It urged a "coordinated cooperative research program...inaugurated at the earliest possible date."

The bottleneck to increasing the acreage of improved varieties is the inadequate supply of foundation seed for prospective seed producers. Facilities for the production of foundation seed are lacking, along with information as to the best methods of assuring a supply. There is evidence that in many cases larger yields can be obtained and seed can be produced cheaper in areas far removed from the farms on which it is to be used. An important problem is to adapt for seed production the many improved varieties of various kinds of forage crops.

Production of the seed of grasses and legumes is an uncertain and hazardous farm enterprise. For example, the average yield of alfalfa seed in 1945 was only 1.33 bushels per acre. In some crops, particularly grasses, the seed is seriously low in viability. The reasons for the low seed yields are not clearly understood. Insects are one factor, diseases are another. Deficiencies in minor elements, inadequate information on the best cultural practices for seed production, and weeds are also important factors. The problem is complicated and requires a research program involving all the factors believed important. The committee believes that of those mentioned, a study of insects in relation to the production of seed is most important, to be followed by work on the other factors in the order named.

2. Breeding superior seed-producing varieties.--Next in importance the committee named the breeding of superior seed-producing varieties that are also superior in feed values. Much can be done, it said, in producing varieties that are disease resistant and otherwise desirable, and that produce high yields of seed as well. New varieties whose flowers are more attractive to pollinating insects are one possibility. The amount and kind of pollen and its availability are another. Hybrid alfalfa promises greater progress in alfalfa improvement and production

than has hitherto been possible. Additional studies should be made of the possibilities and methods of producing hybrid alfalfa seed commercially, and of the application of these breeding principles to production of other forage crop seeds.

Marketing Problems

1. Marketing seed of improved varieties of grasses and legumes.--Of the problems involved in marketing forage crop seed, the committee gave top priority to the marketing of seed of improved varieties. At present, it said, less than 2 percent of the seed sold is of these varieties. In appearance, superior varieties usually cannot be distinguished from inferior varieties. Information is needed on what records are necessary to preserve the identity of improved varieties, and on whether the records now used are adequate or excessive. This information would also help in developing a system for marketing a large volume of seed of improved varieties through trade channels with adequate consumer protection.

2. Storage.--Information on the best ways to store seed corn to maintain its viability would be valuable to the hybrid seed corn industry. Limited quantities of seed of foundation inbred lines and single crosses are commonly stored from 1 to 4 years. This practice should be expanded, the committee said, for the good of the industry. Many seed producers believe a full year's requirement of foundation seed stocks should be carried over each year, to protect the industry from any serious loss resulting from unfavorable weather. An increasing tendency among careful seed producers to test every lot of foundation seed for outcrossing before it is used for seed production means that the seed must be held in storage at least a year before it is used. Storage difficulties are aggravated because some of the very important inbred lines lose their viability very rapidly even under good storage conditions. This is also true when they are used as seed parents in the production of single crossed seed. An urgent need is an engineering-biological study to develop economical, large-scale, storage facilities for seeds in various climates.

Special attention should be given to losses caused by injurious insects, such as the granary weevil, rice weevil, lesser grain borer, and Angoumois grain moth. Reasonably satisfactory methods for controlling some of the insects have been developed, such as fumigation or treatment of seed stocks with dusts fortified with insecticides. But additional research is needed to appraise the control value of the many new insecticides and fumigants coming into use, the compatibility of these insecticidal dusts with fungicides, and the toxicity to livestock when treated seed is diverted to use as feed.

3. Statistics and market information.--Also needed is research directed toward developing information to minimize the risks that seedsmen take in owning seeds from the time they leave the grower until planting time. More information is needed about the effect of weather on seed production and consumption. This would help seedsmen and farmers to make better appraisals of seed supply and demand. The committee also

recommended further research in marketing statistics, especially as related to seed production and stocks, monthly sales by growers, and stocks on hand on January 1.

4. Standardization of testing methods.--The testing of forage crop seed for purity and germination involves many problems whose solution would promote orderly marketing and accurate and uniform determinations of seed quality. Especially important are problems connected with delayed germination of freshly harvested seed, the value of abnormal seedlings, the time required to test for germination, quicker determination of the purity of chaffy grass seeds, and the viability of weed seeds. Little is known about methods for testing many kinds of seeds that have recently become commercially important; improvement of procedures and equipment is essential, the committee said.

VEGETABLE SEEDS

Production Problems

The most important production problems, the committee said, are concerned with breeding varieties for multiple resistance to disease and insect damage, the use of F_1 hybrids, the maintenance of special resistant characteristics, and the evaluation of seed treatments for disease control. Work on these problems, the committee said, should be limited to basic research. Foundation seed stocks should be turned over to vegetable seed growers promptly for multiplication and distribution, so that the stocks may be used in further breeding work to establish other varieties.

Marketing Problems

The committee rated the collection and distribution of statistics on acreage, yield, production, disappearance, and stocks on hand as of first importance in the marketing field.

Second priority went to a study of proper storage conditions for retaining germination of seed in storage and for protecting stored vegetable seed from insect infestation.

Third on the priority list was a study intended to provide accurate and uniform determinations of the purity and germination of vegetable seeds.

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Soybeans and flaxseed compete with other crops for the use of land, and the oil and meal obtained in processing them compete with the products of other oilseeds, animal fats, and corn and other feedstuffs. Because of these competitive interrelationships, the Soybeans and Flaxseed Advisory Committee said in its report, research needs for soybeans and flaxseed cannot be considered independently of the research needs of other direct oil-bearing crops. The report was broadened to include research requirements for tung nuts, castor beans, and miscellaneous di-

rect oil-bearing crops such as rapeseed, safflower seed, and sunflower seed.

Research on soybeans, flaxseed, other oilseeds and their products now under way in the USDA should be continued, the committee said. Work on some lines of research needs to be sharply accelerated, and a few new lines of research should be added. Among the more pressing problems requiring intensified research are the following:

Breeding improved varieties of soybeans for each level of soil productivity and all climate and weather conditions, from South to North.

Discovery of methods for controlling soybean diseases, some of which are becoming serious.

Development of crop rotations and other practices to give maximum yields of soybeans and other crops in the rotations.

Study of flavor stability of oils and fats, aimed particularly at solving the problem of flavor reversion in soybean oil.

Fundamental research on soybean and linseed proteins, and study of new uses for the proteins.

Research on farm storage problems for soybeans and flaxseed with a view to promoting more orderly marketing.

Other research and service needs to which the committee gave somewhat less urgent priority were:

Breeding research for tung nuts, castor beans, and rapeseed, the oils of which have been certified as strategic commodities.

Studies in the economics of producing oilseeds.

Studies of the chemical and physical properties of vegetable oils and new uses for the oils.

Development of better methods of processing oilseeds, including use of improved solvents.

Development of a method to determine the oil content of the small lots of soybeans and flaxseed delivered by farmers.

Analysis of the need for a market news service covering oilseeds and their products.

Quarterly estimates of stocks of flaxseed in all positions.

A survey of tung trees to determine number of age groups and future production trends.

Production and consumption statistics for minor soybean products.

Expansion of current information on foreign production, consumption, trade, and prices of oilseeds, fats, and oils.

Analysis of data now available on the economics of the oilseed-processing industry.

A study of the freight-rate structure for oilseeds and their products.

A study of the operation and effects of the futures market on prices and marketing of oilseeds and their products.

A study of the place and value of cooperative marketing organizations in marketing oilseeds and their products.

An economic analysis of the interchangeability between oils.

Nutritional and consumer-preference studies for food fats and oils, soya flour, and canned and dried soybeans.

Comprehensive production, price, and consumption analysis using time-series and budgetary data.

A strong educational program for producers, processors, manufacturers, dealers, and consumers of oilseeds and their products, bringing research findings to light.

Research on improved educational methods.

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The Vegetable Advisory Committee gave priority in the following order to the research it recommended:

1. Retail merchandising.--The committee recommended a careful examination of the practices now used in retailing both fresh and processed vegetables. This should be followed by an appraisal to determine how the practices can be improved to promote freer movement of vegetables from farm to consumer with quality unimpaired and with less loss, waste, and unnecessary service.

The committee called for the placing of produce specialists on agricultural college extension staffs to work with retailers in cooperation with departments of agriculture and trade organizations. A Nation-wide program should be organized, the committee said, to improve the retail merchandising of fresh and processed vegetables.

2. Consumer packaging.--Also recommended was an appraisal by USDA of all the consumer packaging of vegetables now used, and the establishment of a clearinghouse for information on this phase of the industry. Chemical, biological, and engineering research is needed to develop ways of getting vegetables to the consumer in fresh or processed form with their natural freshness unimpaired. Collaboration through technical as-

sistance or by contract with existing experimental laboratories and other groups in the industry should be obtained in order to improve consumer packaged vegetables.

3. Distribution costs.--Research on the cost of distribution of vegetables should be organized and carried through from producer to consumer for all functions and systems of marketing. The aim, said the committee, should be to learn which functions cost most, and where economies might be made as a guide to future market developments. The studies should cover areas distant from markets as well as near by.

4. Production.--The quality that consumers want and buy must be protected and established through the breeding and development of better varieties, the committee said. These varieties will produce largeryields with higher nutritive values, and will also resist diseases and insects. Vegetables must be free from insects and diseases when they go to market. This means expansion of vegetable breeding and more work on new varieties adapted to the important vegetable growing areas. It also means further development of fungicides, insecticides, and their uses.

A great many private organizations are developing chemicals for disease and insect control. These chemicals should be tested carefully for various crops and producing areas.

5. Utilization of wastes and surpluses.--Further research should be made on the methods of using vegetable wastes and surpluses.

6. Terminal markets.--Ways need to be discovered to compose the differences of the various groups that would be affected in the revision of terminal markets. These groups include local government, property owners, operators, and labor and transportation agencies.

7. Refrigeration and storage.--Highly perishable vegetables should be cooled to temperatures slightly above freezing just after they are harvested. The optimum temperature for retaining freshness should then be maintained from the harvest field through transportation, wholesale marketing, and the retail store to the consumer. Equipment suitable for all these stages is necessary.

Part of the vegetable crop must be stored, at the various stages of marketing, in order to provide a stable supply for the consumer throughout the year. Research in the biology, economics, and engineering of the various kinds and periods of storage is essential.

8. Agricultural engineering.--Precision planting of seed and plants should be further developed. New and improved types of tillage equipment should take the place of hand weeding. Also needed are sprayers and dusters for both ground equipment and airplanes that will give thorough, uniform coverage. Improvements are needed in equipment which, through the application of chemicals or heat, will reduce weeding expense.

9. Marketing information.--This information should include production of local market gardens as well as that of the so-called truck crop

areas. It should cover intended acreage, and movement to market by all forms of transportation. Price reports should be expanded to include prices to the grower at the farm or country shipping point, to the wholesaler at the receiving point, and to the retailer at the retail level. This information should reflect day-to-day price variations and, if possible, any waste or loss in distribution channels.

10. Market diseases and deterioration.--Losses from market diseases remain high. Research is needed on the extent of such losses where they occur, their economic significance, and how they may be prevented. Emphasis should be put on the decays of tomatoes in transit from farm to processing plant or consumer, in ripening rooms, and on retailers' shelves. Studies should be made of the use of after-harvest treatments as a control for decay or deterioration.

11. Transportation.--The committee stressed the need for better equipment, more handling care, prompter service, and equitable transportation rates for perishables. Grower and distributor should understand, for particular vegetables, the speed of the form of transportation selected, the protection it will give the product, and the cost.

Rate structures should be analyzed for the various producing areas and for all forms of marketing vegetables, fresh and processed. All forms of transportation, with refrigeration and without, should be examined and appraised for relative efficiency.

12. Soil fertility.--Acre yields for vegetables have increased little during the last 30 years. More information is needed on soil analysis, fertilizer placements, and time of application and the sources of nitrogen. The information should take into account the requirements of specific crops in specific localities.

13. Containers.--The best kinds, sizes, and types of packages now on the market should be appraised. Where necessary, better packages should be developed to meet requirements for good merchandising. These new packages should be standardized and reduced in number to a practical minimum.

State laws applying to these packages should be examined with a view to better standardization and to uniformity in state requirements.

14. Nutritional value.--A better selection and use of vegetables, along with other protective foods, would provide consumers with enough vitamins and minerals in the diet. Research in this field should be made an important part of research for vegetables.

15. Export markets.--The committee recommended an investigation of vegetable export markets, especially for processed vegetables. The purpose would be to help in the disposal of present surpluses and to carry out the policy of furnishing food from commodities in the best supply for countries obtaining relief. This investigation, the committee said, should take into account the possible development of a permanent export market as well as current foreign needs.

MARKETING BRIEFS:

Citrus Fruits.--USDA has recommended adoption, subject to industry approval, of amendments to the Florida citrus fruit marketing agreement and order program. The amendments provide that regulations may be issued containing grade and size limitations for the Indian River section different from those authorized for the rest of the State.... Until Mexican fruitflies reappear in the Texas area under regulation for this pest, plant quarantine requirements are waived by USDA effective September 1, when harvesting of citrus fruits begins officially in the affected areas (the counties of Brooks, Cameron, Dimmit, Hidalgo, LaSalle, Webb, Willacy, and part of Jim Wells county).

Cotton.--The loan program on 1947-crop American-Egyptian cotton was announced August 22 by USDA. The loan rate for the basic quality (grade No. 2, 1½ inches) will be 56.60 cents a pound, net weight, in the Arizona-California area and 56.85 cents a pound, net weight, in the New Mexico-West Texas area. Actual market differences from August 1, 1946, through June 30, 1947, were used in establishing loan differentials between the various qualities of cotton.... USDA has announced the continuation, at a lower incentive rate, of its program to promote the use of low-grade, short-staple cotton in the manufacture of insulating materials used in homes and other structures. During the current fiscal year, manufacturers who hold approved applications will receive 5 3/4 cents a pound, gross weight, on cotton used in compliance with program provisions.

Dairy Products.--Between July 28 and August 28, PMA activities concerning milk marketing agreements and orders included: Announcement of amendment of six orders--Chicago (No. 41); Clinton, Iowa (70); Quad Cities (Rock Island, Moline, East Moline, Ill., and Davenport, Iowa--No. 44); New York (27); Cleveland (75); and St. Louis (3). Scheduling of an emergency hearing to consider proposals for the amendment of the Dubuque, Iowa, order (12). Announcement of recommendations on industry proposals for amendment of the Louisville order (46).

Fats and Oils.--On August 19 USDA announced an emergency export allocation of 3,000 short tons of linseed oil which had been acquired by the Commodity Credit Corporation from Argentina. This oil will be re-exported by the present commercial holders and is in addition to an emergency allocation of 8,250 long tons of linseed oil which was announced August 7.... USDA's Commodity Exchange Authority has inaugurated a daily statistical release on futures trading in cottonseed meal and soybean meal. The report provides summary figures on the volume of trading and open contracts, by futures, in cottonseed meal and soybean meal on the Memphis Merchants Exchange Clearing Association, futures market for these commodities.

Grain.--USDA estimated on August 7 that 1,847,587 long tons (72,-019,948 bushels) of U. S. Grain and grain products were exported in July. Included, in terms of whole grain equivalent, long tons, were 623,947 tons of wheat, 589,000 tons of flour, 395,007 tons of corn, and 239,563 tons of other grains.... Grain export quotas for October, an-

nounced August 19 by USDA, total 1,213,400 long tons (45,685,000 bushels) of wheat, flour (in wheat equivalent), barley, and grain sorghums. No corn is included in the October grain export program.

Livestock and Meat.--On August 8, USDA announced a special allocation of 15,000,000 pounds of lard for commercial export. The allocation, in line with recommendations of the International Emergency Food Council, is intended to meet urgent needs in the countries to which it will be sent.... On August 28, USDA announced the purchase of 3,024,000 pounds of lard and rendered pork fat (including 2,656,000 pounds of lard and 368,000 pounds of rendered pork fat) at an average price of \$18.61 per hundredweight at New York. The supplies will be used for relief feeding in Austria.... Through its Commodity Credit Corporation, USDA has contracted with a firm in Juarez, Chihuahua, Mexico for the purchase of 1,000,000 pounds of canned meat and gravy. The product is being resold by CCC to the International Refugee Association for the feeding of refugees in Europe. The purchases provide an outlet for cattle in northern Mexico. Cattle from this area were formerly exported to the United States. Under normal conditions imports of Mexican cattle to the U. S. amount to about 500,000 head annually. But since the outbreak of foot-and-mouth disease in southern Mexico, the importation of cattle and other susceptible animals from Mexico to the U. S. has been prohibited. Details are being worked out with the Mexican Government and the Mexican cattle industry under which USDA is expected to purchase much larger quantities of the canned meats for resale and consumption outside the United States.... Wild-animal eradication experts of the U. S. and Mexico are making plans for the slaughter of infected cloven-footed wild game within the main zone in Mexico quarantined for foot-and-mouth disease. Because the virus attacks all cloven-footed animals, domestic and wild alike, veterinarians of the Mexican-United States Commission who are directing the fight against the malady say that unless destroyed these animals--principally deer, antelope, and wild swine--may spread the virus to disease-free areas.

Tobacco.--Contracts for price-support loans at 90 percent of parity on 1946-crop Puerto Rico tobacco were signed on August 21 by CCC and two Puerto Rican organizations of growers. Negotiations are under way looking to the signing soon of similar contracts with Puerto Rican dealers. This is the first time loans have been requested by grower representatives under the provisions of the Agricultural Adjustment Act of 1938, because prices have been higher than the applicable loan levels.

Wool.--Because of the generally good demand, USDA on August 5 increased the selling price of finer grades of wool owned by the Commodity Credit Corporation. The increase amounted to from 1 to 2 cents a pound, clean basis, on the grades involved. For example, the selling price on staple fine Territory graded wool was increased from \$1.23 to \$1.25 a pound, clean basis. Selling prices on most grades below "fine" are unchanged.... USDA has announced a resumption of the wool price-support program, effective August 15. New legislation provides for price support at the 1946 level and makes it possible for CCC to sell its stocks on a competitive basis. Previously, legislation required that such wool be sold at not less than parity.

PASTEURIZATION TEST CAN BE APPLIED NOW TO ALMOST ALL DAIRY PRODUCTS

A modified phosphatase test, originally developed and perfected for use on Cheddar cheese by USDA's Bureau of Dairy Industry to determine whether milk used in making cheese has been pasteurized, has now been developed so that it can be applied to practically all dairy products.

The products so far tested with success include fluid milk; cream; Cheddar, Swiss, and other hard cheeses; process cheese and cheese spreads; cottage and other soft, unripened cheeses; butter; buttermilk; fermented milk drinks; ice-cream mix; sherbet; chocolate milk; cheese whey; and (with less sensitivity) goat's milk.

Public Health Safeguard

The test promises to be useful as a public health safeguard. During the war a number of disease outbreaks were traced to the eating of uncured raw-milk cheese, and several States have passed regulations requiring that cheese be either made from pasteurized milk or cured for a definite period before retail sale. Development of a reliable pasteurization is therefore important to the cheese industry and the public.

With the new test, cheese manufacturers, public health officials, and Federal regulatory agencies can now cooperate in setting up standards of identity that include pasteurization of milk for most kinds of cheese. Promulgation of such standards as a public health measure is under consideration by regulatory agencies. The test also makes possible the establishment of similar standards for milk, cream, ice cream, and all other dairy products.

Known as the Sanders and Sager phosphatase test, the test is a modification of the older Scharer phosphatase test used for determining the adequacy of pasteurization of fluid milk. The improvement resulted from research in the Bureau's laboratories on the chemical nature and activity of the phosphatase enzyme in milk. Worked out experimentally for Cheddar cheese in 1945-46, it is now applied to other dairy products.

The test depends on the fact that all normal raw milk contains a phosphatase enzyme which is destroyed by heating at a temperature a few degrees higher than that required to destroy the most resistant of the pathogenic or disease-producing organisms that may occur in milk. The test is so sensitive that it will detect the presence of 1 pound of raw milk in 2,000 pounds of properly pasteurized milk, or of 1 pound of raw cream in 5,000 pounds of pasteurized cream.

It is well known that pasteurization destroys the pathogenic organisms that may occur in milk, as well as a large proportion of those that cause spoilage of dairy products. The usual, standard temperatures for milk pasteurization are 143° F. for not less than 30 minutes or 160° for not less than 15 seconds, or an equivalent heat treatment. The new test gives a sensitive indication of any variation in the heat treatment below the standard.

The following addresses and publications, issued recently, may be obtained upon request. To order, check on this page the items desired, detach and mail to the Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

Addresses:

Summary of remarks by Clinton P. Anderson, Secretary of Agriculture, at the annual meeting of the Agricultural Labor Bureau of the San Joaquin Valley, at Fresno, Calif., over the McClatchy Network. August 4, 1947. 6 pp. (Mimeographed)

The Department of Agriculture's Position on Cotton Mechanization, by E. D. White, Assistant to the Secretary of Agriculture, before the Cotton Mechanization Conference, Stoneville, Miss. August 19, 1947. 6 pp. (Mimeographed)

The Cattle Situation and Outlook, by Charles A. Burmeister, Livestock Branch, PMA, before the annual convention of the Sandhills Cattle Association, Broken Bow, Nebr. August 29, 1947. 8 pp. (Mimeographed)

Publications:

Quantities of Food for Serving School Lunches. (Bureau of Human Nutrition and Home Economics) July 1947. 18 pp. (Multilithed)

The Agricultural Conservation Program on California's Farms and Ranches. (PMA) July 1947. 12 pp. (Printed). (PA-31).

Farmers' Produce Markets in the United States--Part II, Plans and Facilities. (Farm Credit Administration) May 1947. 118 pp. (Multilithed)

Cotton Classing and Market News Services for Organized Groups of Growers. (PMA) July 1947. Folder. (Printed)

A series of five 2-page releases were issued in August for use in connection with egg quality conservation, which PMA and the State offices and Extension Service were asked to emphasize during the hot-weather months. Titles of the releases are: Quality Conservation of Eggs; Frequent Marketing Aids Egg Quality Conservation; Keeping Eggs Clean Helps To Conserve Quality; Candling Assures Consumers of Better Eggs; and Consumers Can Get More for Their Egg Money.

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